

Name: _____

Math 10F&IPC Honours

Date: _____

Chapter 1 Measurement**1.2 Math Lab Measuring Lengths and Distance****Warm Up:** Rewrite each of the following formulae, solving for the indicated variable.

a) $\frac{mv^2}{r} = \frac{GMm}{r^2}$, for v .

$$\cancel{mr^2} v^2 = \frac{GM \cancel{m}}{\cancel{mr^2}} \quad v = \sqrt{\frac{GM}{r}}$$

b) $S(r-1) = rL - a$, for r .

$$\begin{aligned} Sr - S &= rL - a \\ Sr - rL &= S - a \quad r\left(\frac{S-L}{S-L}\right) = \frac{S-a}{S-L} \end{aligned}$$

$$r = \frac{S-a}{S-L}$$

1 cm = 10 mm
 1 m = 100 cm
 1 m = 1000 mm
 1 km = 1000 m
 1 km = 100 000 cm
 1 km = 1000 000 mm

SI Unit	Abbreviation	Relationship
meter	m	1 m = 100 cm 1 m = 1000 mm
centimetre	cm	1 cm = 0.01 m 1 cm = 10 mm
millimetre	mm	1 mm = 0.001 m 1 mm = 0.1 cm

1 mm = 0.001 m
 1 mm = 10^{-3} m
 1 mm = 10^{-6} km
 1 cm = 10^{-5} km

Example 1:**(a) Convert to centimetres:**

(i) 7.3 m

$$7.3 \cancel{\text{m}} \times \frac{100 \text{ cm}}{1 \cancel{\text{m}}} = \boxed{730 \text{ cm}}$$

(ii) 253 mm

$$253 \text{ mm} \times \frac{1 \text{ cm}}{10 \text{ mm}} = \boxed{25.3 \text{ cm}}$$

(b) Convert to metres:

(i) 225 cm

$$225 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = \boxed{2.25 \text{ m}}$$

(ii) 4286 mm

$$4286 \text{ mm} \times \frac{1 \text{ m}}{1000 \text{ mm}} = \boxed{4.286 \text{ m}}$$

(c) Convert to millimetres:

(i) 3.5 cm

$$3.5 \text{ cm} \times \frac{10 \text{ mm}}{1 \text{ cm}} = \boxed{35 \text{ mm}}$$

(ii) 2.7 m

$$2.7 \cancel{\text{m}} \times \frac{1000 \text{ mm}}{1 \cancel{\text{m}}} = \boxed{2700 \text{ mm}}$$

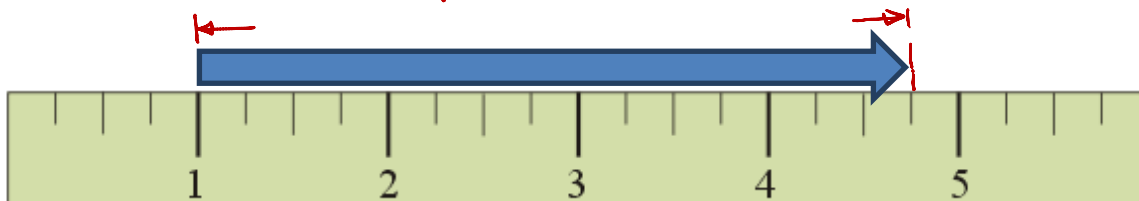
Example 2: Which unit of length is the most appropriate unit to measure each item?

Item	Imperial	SI	Referent
Width of the classroom	yard	meter	door
Height of a desk	ft	m / cm	math text book
Length of a paperclip	in	cm	thumb
Thickness of a nickel	in	mm	"

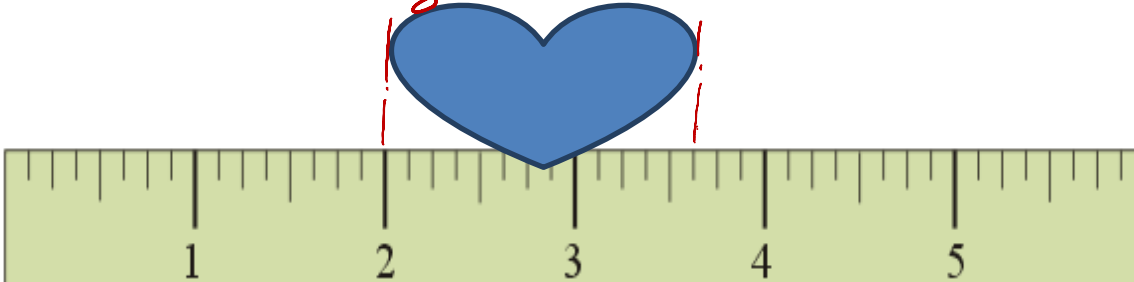
Example 3:

Give the measures of the following objects using the rulers provided and answer the questions.

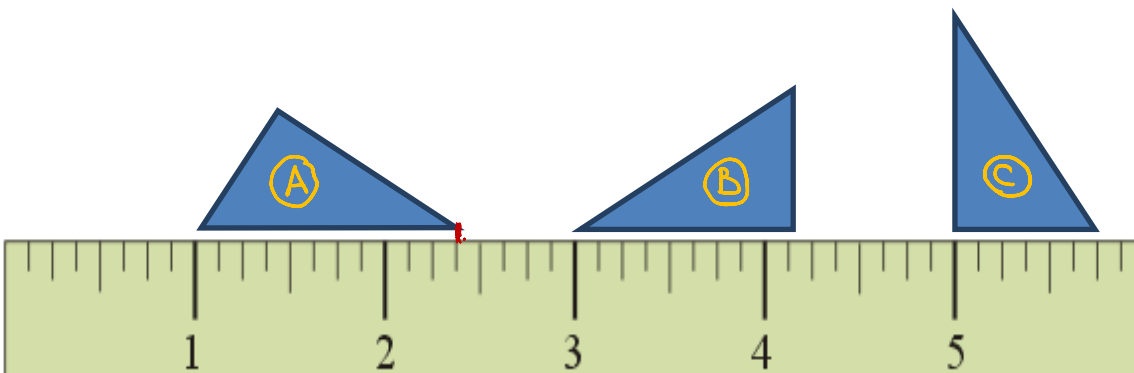
- a) Length of the arrow: $3\frac{3}{4}$ in



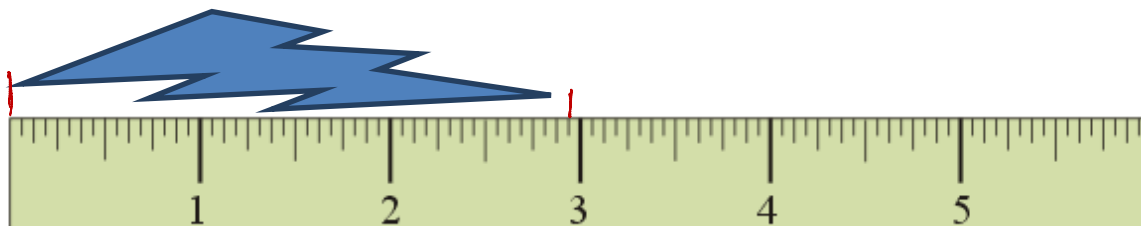
- b) Width of the heart: $1\frac{5}{8}$ in



- c) Dimensions of the triangle: $A = 1\frac{3}{8}$ in $B = 1\frac{1}{8}$ in $C = \frac{3}{4}$ in



- d) Length of lightning bolt: $2\frac{15}{16}$ in

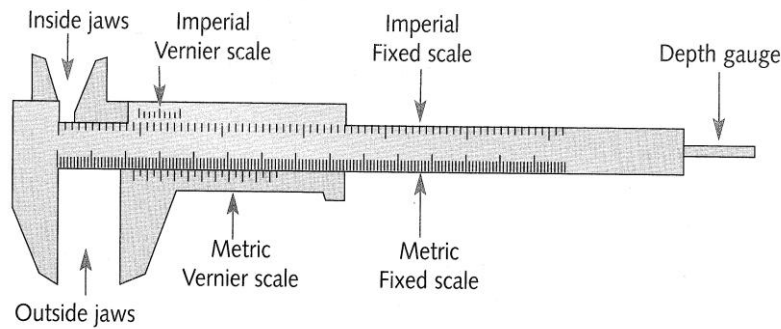


Try: A map of BC has a scale of 1:4 550 000. The distance on the map between Kelowna and Vancouver is $3\frac{9}{16}$ in. What is this distance to the nearest mile, yard, foot and in?

$3\frac{9}{16}$ in ≈ 256 mi $\cdot 450$ yd $\cdot 1$ ft $\cdot 3$ in

Assignment: page 15 Q. #1-6

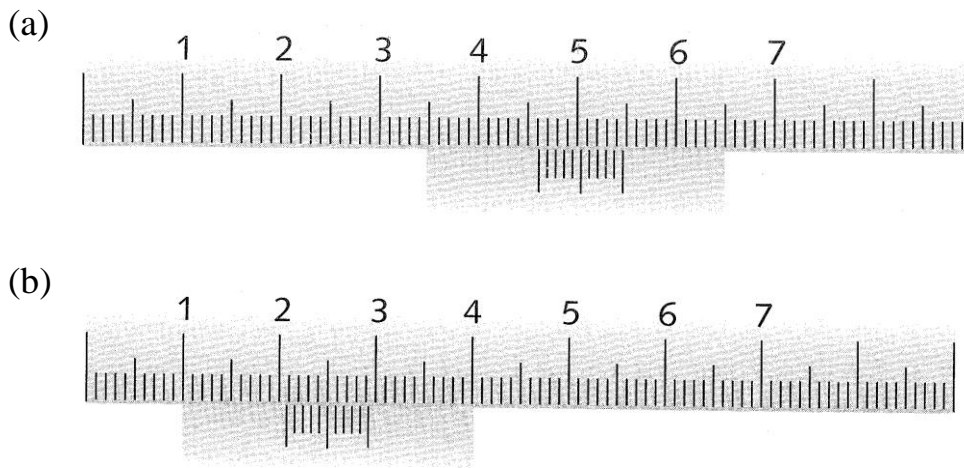
Vernier Calipers



To Read Vernier calipers: Check where the first line on the moving scale lands. It will point to a place on the fixed scale. This position determines the first digits of the reading.

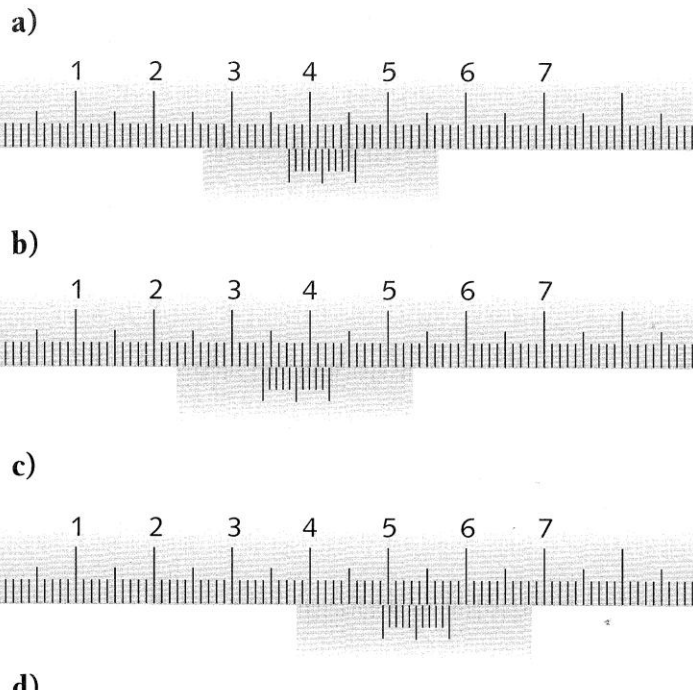
Find the last digit of the reading by examining which line on the moving scale aligns best with a line on the fixed scale. The line on the moving scale determines the last digit.

Example 1: Read the following Vernier caliper measurements.



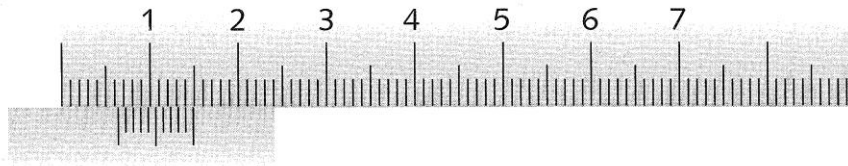
Try This

1. Read the following Vernier calipers. The scale is in metric units.

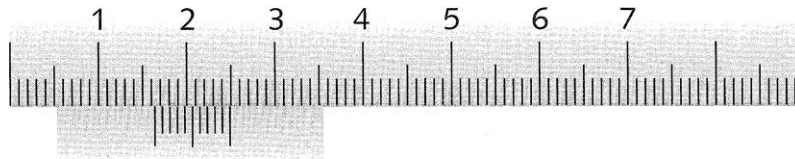


2. Read the following Vernier calipers. The scale is in metric units.

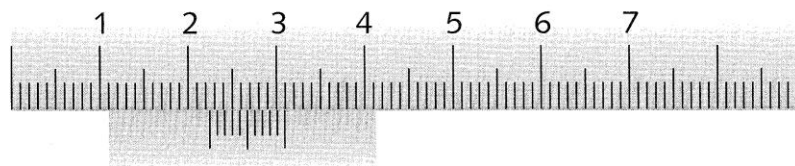
a)



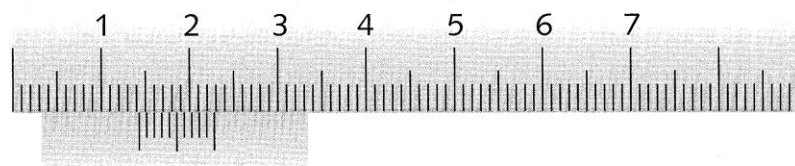
b)



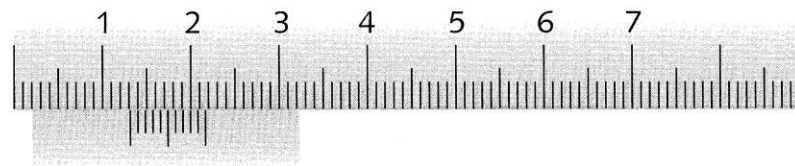
c)



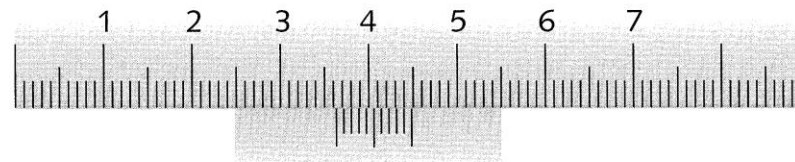
d)



e)



f)



Imperial Units to SI Units	SI Units to Imperial Units
1 in. \doteq cm	1 cm \doteq in.
1 ft. \doteq cm	1 m \doteq in. 1 m \doteq ft. in. 1 m \doteq yd. ft. in.
1 yd. \doteq cm 1 yd. \doteq m	1 km \doteq yd.
1 mi. \doteq m	

When taking measurements of objects, we can either make an estimate or make an exact measurement. When making estimations, we can use an object as a measurement unit. This object is called a referrent. Some examples of referrents and their approximate sizes are:

textbook : 2cm thick

hand : 12-18 cm

thumb : 1.5-2cm

height / armspan - varies.

foot : 20-30 cm

stride : 1 meter.

When making exact measurements, there are several instruments that can be used. Some examples would be:

ruler, meterstick, tape measure, range finder.

- micrometer, calipers

- measure very small sizes
or very accurate
measurements